SubTerra, Inc.

Blast Vibration Report

SubTerra, Inc.
North Bend, WA
425.888.5425

Date: 10/6/2010 Time of Blast: 6:06 am / (pm) Blast Number: SN2

Client: KLB/Sandcrs Project Number: 2010-24

Project: I-90 Hyak City, State, Zip: Hyak. Wa.

Shot Location: Snoqualmie Pass

Pre ~ Pattern 1 - No. Holes: 48 Burden-Ft: — Spacing-Ft: 1' No. Decks: 0 Max.W-Lbs: 6 lbs 3 Holes 18 lbs

Prod ~ Pattern 2 - No. Holes: 57 Burden-Ft: 6 Spacing-Ft: 6 No. Decks: 0 Max.W-Lbs: 50 lb

Pattern 3 - No. Holes: ____ Burden-Ft: ____ Spacing-Ft: ____ No. Decks: ____ Max.W-Lbs: ____

Distance to Nearest Structure-Ft: 96' Identify Structure: Soil nail wall

Weather Conditions - Temperature-°F: ____ Wind: ____ Clouds: ____

Instrument Setup Summary

Unit Location	Seismograph Serial Number	Calibration Date	Sampling Rate	Geo Trigger Level (in/s)	Maximum Range (in/s)	Record Time (sec)	Geophone Orientation
M1	BE9247	7/27/11	~~1024~~	1 in/sec	~~10~~ 100	4	North
M2	BE9248	7/30/11	4096	.06 in/sec	10	4	West
M3	BE10408	09/13/11	4096	.06 in/sec	10	4	Wall Mount
M4							
M5							
M6							

Vibration Record Summary

Unit Location	Recording Date	Recording Time	Time Rel. to Trigger	PPV (in/s)	Peak Chan	Freq. (Hz)	Distance to Shot (ft)	Max. Lbs. per Delay	SD
M1	10/6/2010	6:06:31	.862 sec	32.3	Vert	[illegible]	5	6/50 lbs	1.55
M2	10/6/2010	6:07:38	.417 sec	2.61	Long	53	48 1/2	6/50 lbs	19.8 / 8.7
M3	10/6/2010	6:06:44	.885	.84	Trans	71	96	6/50 lbs	35.2 / 15.4
M4									
M5									
M6									

Layout Sketch

Pre STA 1343+70 — 1344+18

Prod STA 1343+28 — 1344+05

— SEE Attached —

Robert Biggs
Seismograph Operator, Print.

Seismograph Operator, Sign.

10/6/2010
Date Signed.

SubTerra, Inc.

Civil & Mining Engineering
Engineering Geology
Tunnel Engineering & Construction Management
Rapid Excavation/Support Systems
Active/Abandoned Mine Subsidence
Quality Assurance / Quality Control
Safety Monitoring of Structures
Blast Optimization / Vibration Monitoring
Mine & Quarry Permitting
Material Science / Laboratory Testing

Thursday, October 7, 2010

Mr. Charley Murphy
Western States Drilling & Blasting
Sent via email to charley@blastwest.com
Sent via email to blastervic@gmail.com

Re: I-90 Hyak to Snowshed Blast Monitoring

Dear Charley and Vic:

This letter summarizes the monitoring results for the blast in the vicinity of the soil nail wall at the I-90 widening project for Blast No. SN2 on October 6, 2010. Three seismographs were installed at the locations shown in the attached figure.

The blast was detonated on October 6, 2010 at 6:06 p.m. All seismographs triggered. Monitoring results are summarized below and Event Reports are attached.

1. Monitoring Point M1 – Seismograph BE9247 with high frequency geophone located 5-ft from nearest presplit blast hole. M1 registered a Peak Particle Velocity of 32.3 in/sec in the vertical direction.
2. Monitoring Point M2 – Seismograph BE9248 with standard geophone located 48.5-ft from nearest presplit blast hole. M2 registered a Peak Particle Velocity of 2.61 in/sec in the longitudinal direction.
3. Monitoring Point M3 – Seismograph BE10408 with wall-mount geophone anchored to soil nail wall 96-ft from nearest presplit blast hole. M3 registered a Peak Particle Velocity of 0.840 in/sec in the transverse direction.

If you have any questions please do not hesitate to call us at 425-888-5425.

Sincerely,

Larry Leone
Project Engineer, SubTerra, Inc.

Enc: Blast Vibration Summary Report
Blast Event Reports (3 ea)
Figure 1: Seismograph Layout

Post Office Box 520, 218 East North Bend Way, North Bend, WA 98045-0520
Phone (425) 888-5425 Web Site: www.subterra.us Email: info@subterra.us Fax (425) 888-2725

Event Report

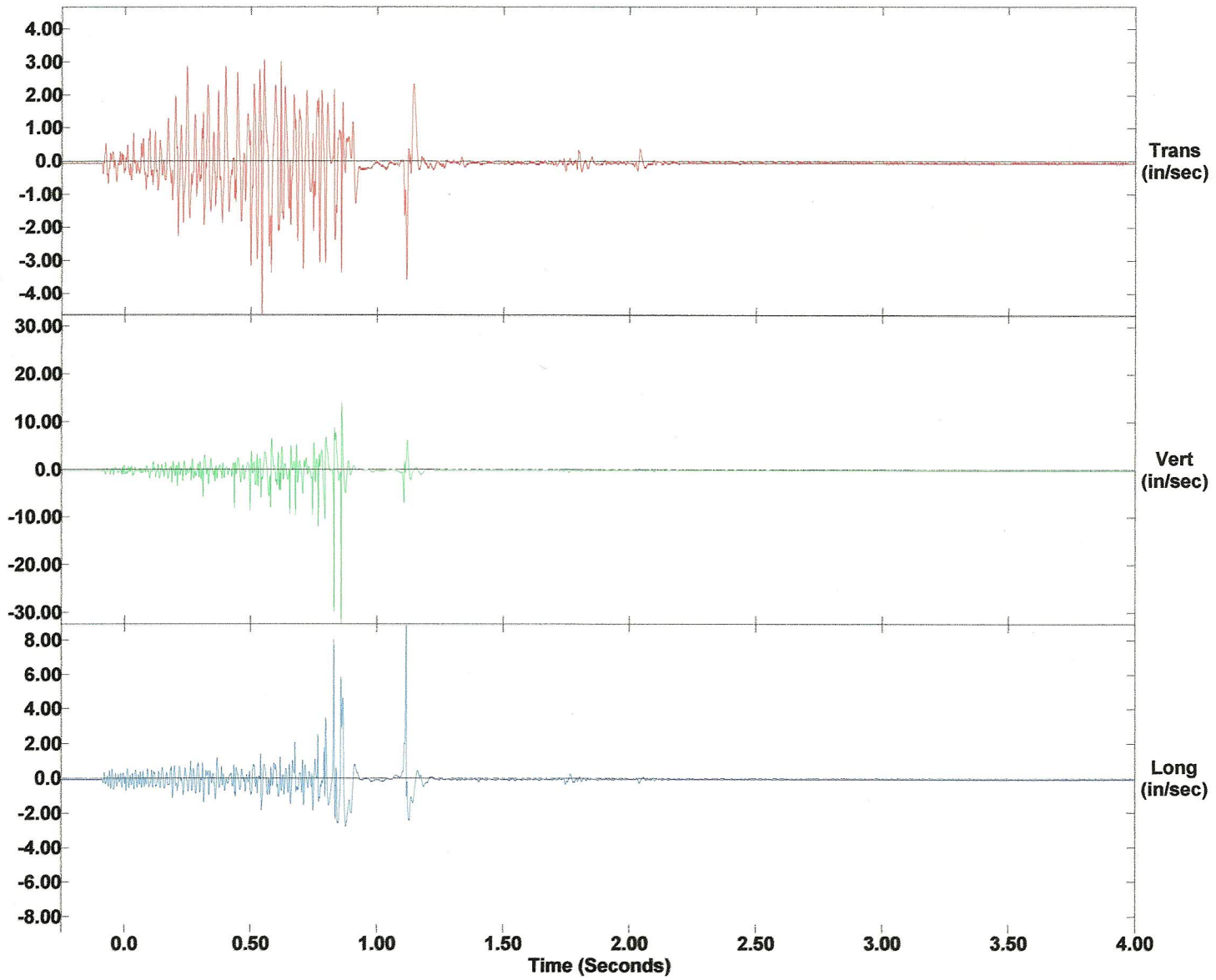
Date/Time Vert at 18:06:39 October 6, 2010
Record Time 4.0 sec at 4096 sps

Serial Number BE9247 V 10.10-8.17 MiniMate Plus
Battery Level 6.3 Volts
Unit Calibration July 27, 2010 by Instantel Inc.
File Name K247DG1G.Z30

Notes
Location: Snoqualmie Pass
Client: KLB Construction
Monitored By: SubTerra, Inc.
Unit Location: M1 - Near Field

Instal Details:
I-90 Widening Hyak to Snowshed.
Post Event Notes
Geophone was located 5 ft. from 3rd blast hole in from the hole @ 1344+18.

Channel	Name	Peak	Time (sec)	Trigger Level	Gain	Range	Units
1	Trans	4.65	0.547	1.000	1x	100	in/sec
2	Vert	32.3	0.862	1.000	1x	100	in/sec
3	Long	8.90	1.119	1.000	1x	100	in/sec



Event Report

Date/Time Vert at 06:07:38 October 7, 2010
Trigger Source Geo: 0.0600 in/s
Range Geo : 10.00 in/s
Record Time 4.0 sec at 4096 sps
Notes
Location: Snoqualmie Pass
Client: KLB Construction
Monitored By: SubTerra Inc.
Unit Location: M2 - Half the Distance to Soil Wall

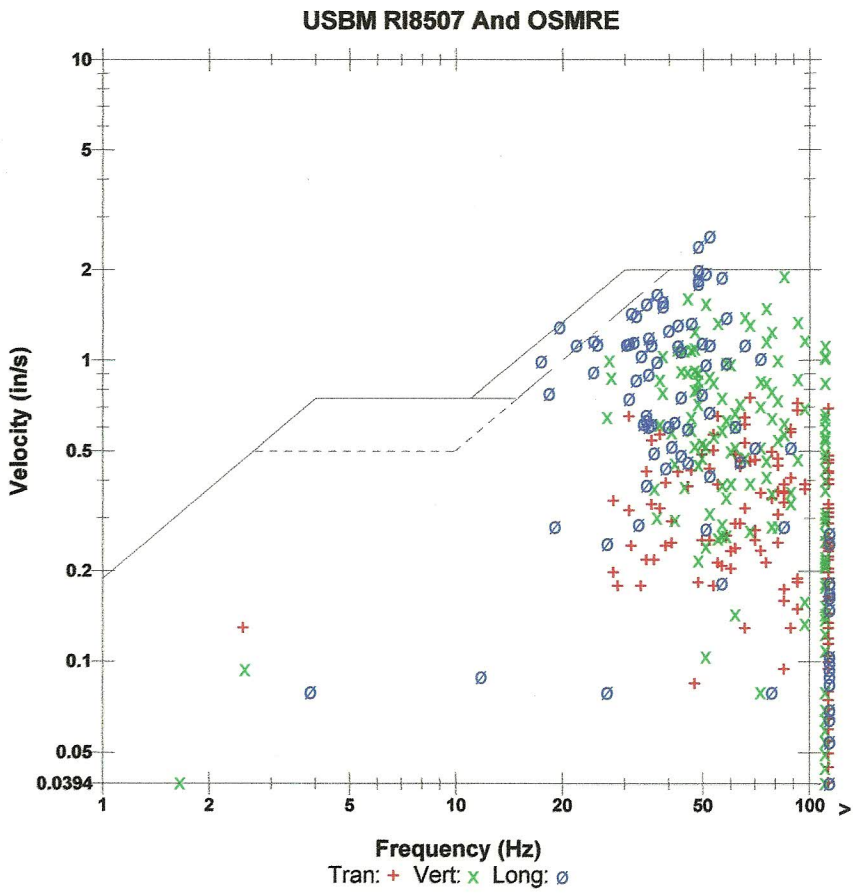
Serial Number BE9248 V 8.12-8.0 MiniMate Plus
Battery Level 6.3 Volts
Unit Calibration July 30, 2010 by Instantel Inc.
File Name K248DG2E.CQ0
Post Event Notes
Geophone was measured to be 48 1/2' from the nearest blast hole.

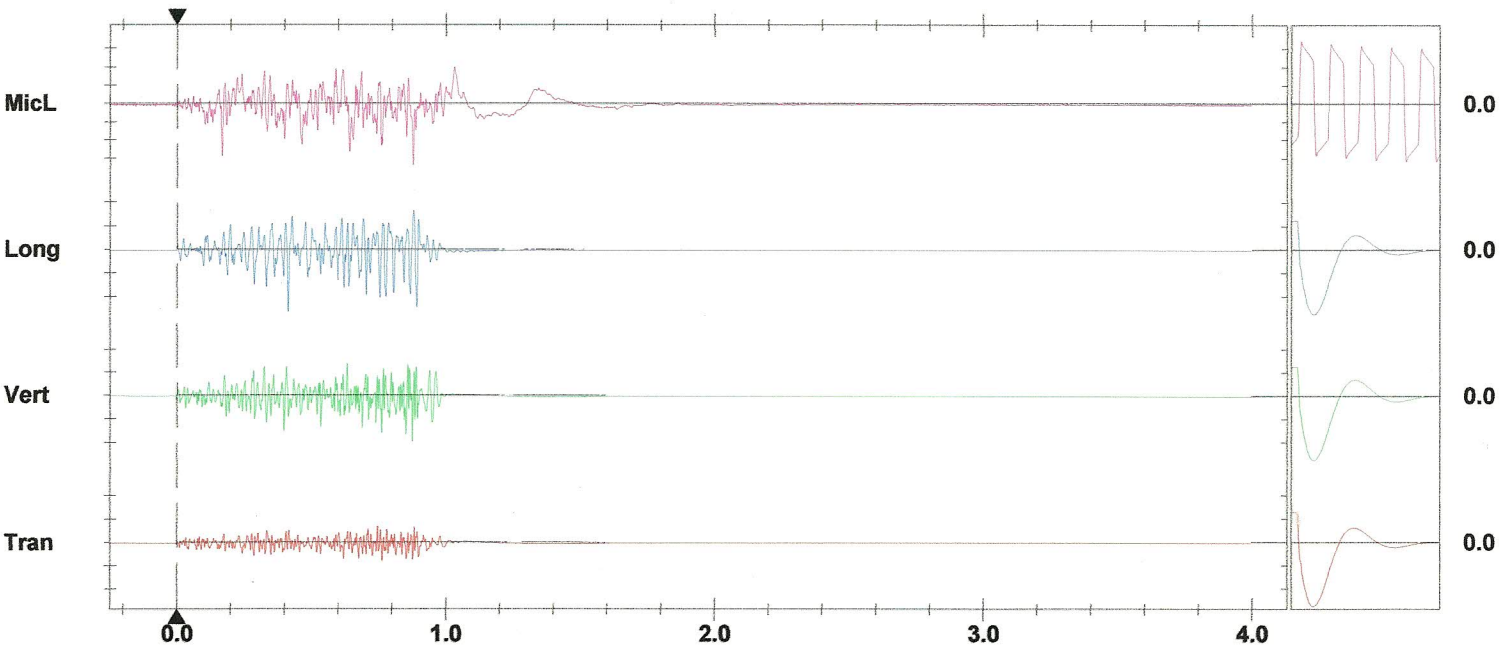
Extended Notes::
I-90 Widening Hyak to Snowshed.

Microphone Linear Weighting
PSPL 0.00667 psi(L) at 0.882 sec
ZC Freq 14.2 Hz
Channel Test Passed (Freq = 20.5 Hz Amp = 596 mv)

	Tran	Vert	Long	
PPV	0.755	1.93	2.61	in/s
ZC Freq	68	85	53	Hz
Time (Rel. to Trig)	0.767	0.879	0.417	sec
Peak Acceleration	1.43	3.08	3.50	g
Peak Displacement	0.00522	0.00536	0.00802	in
Sensorcheck	Passed	Passed	Passed	
Frequency	7.4	7.4	7.2	Hz
Overswing Ratio	4.1	3.8	4.2	

Peak Vector Sum 2.73 in/s at 0.417 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 1.000 in/s/div Mic: 0.00200 psi(L)/div
Trigger = ▶—— ——◀

Sensorcheck

Event Report

Date/Time Vert at 18:06:44 October 6, 2010
Trigger Source Geo: 0.0600 in/s
Range Geo : 10.00 in/s
Record Time 4.0 sec at 4096 sps
Notes
Location: Snoqualmie Pass
Client: KLB Construction
Monitored By: SubTerra, Inc.
Unit Location: M3 - Soil Nail Wall

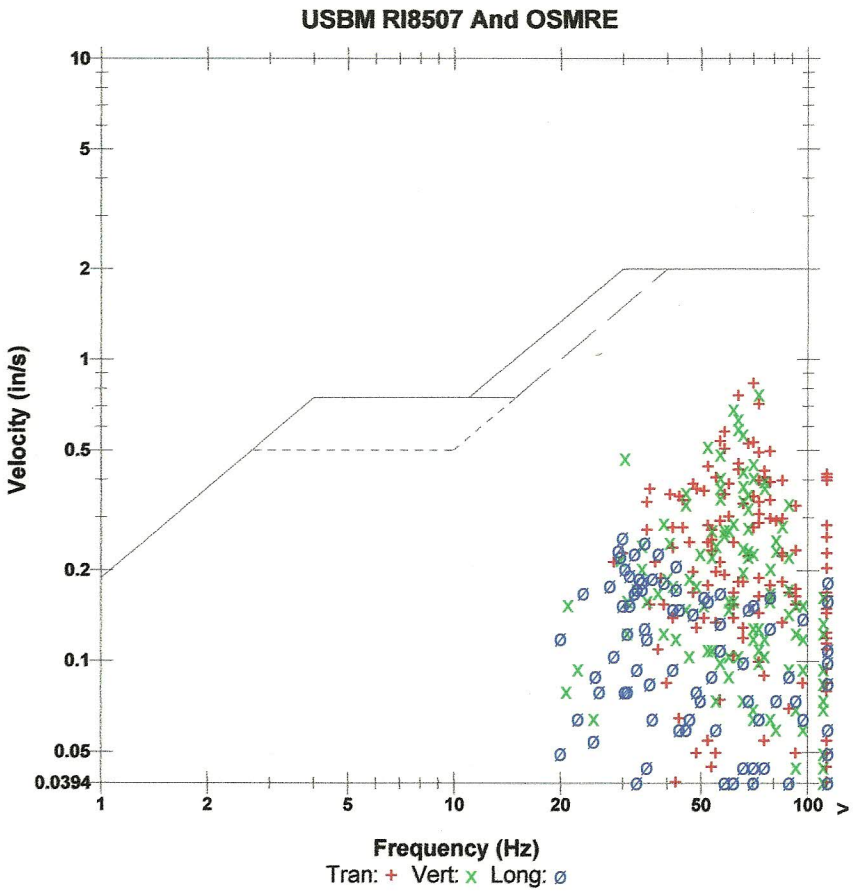
Serial Number BE10408 V 10.10-8.17 MiniMate Plus
Battery Level 6.3 Volts
Unit Calibration September 13, 2010 by Instantel Inc.
File Name L408DG1G.Z80
Post Event Notes
Geophone was measured to be 96' from the nearest blast hole.

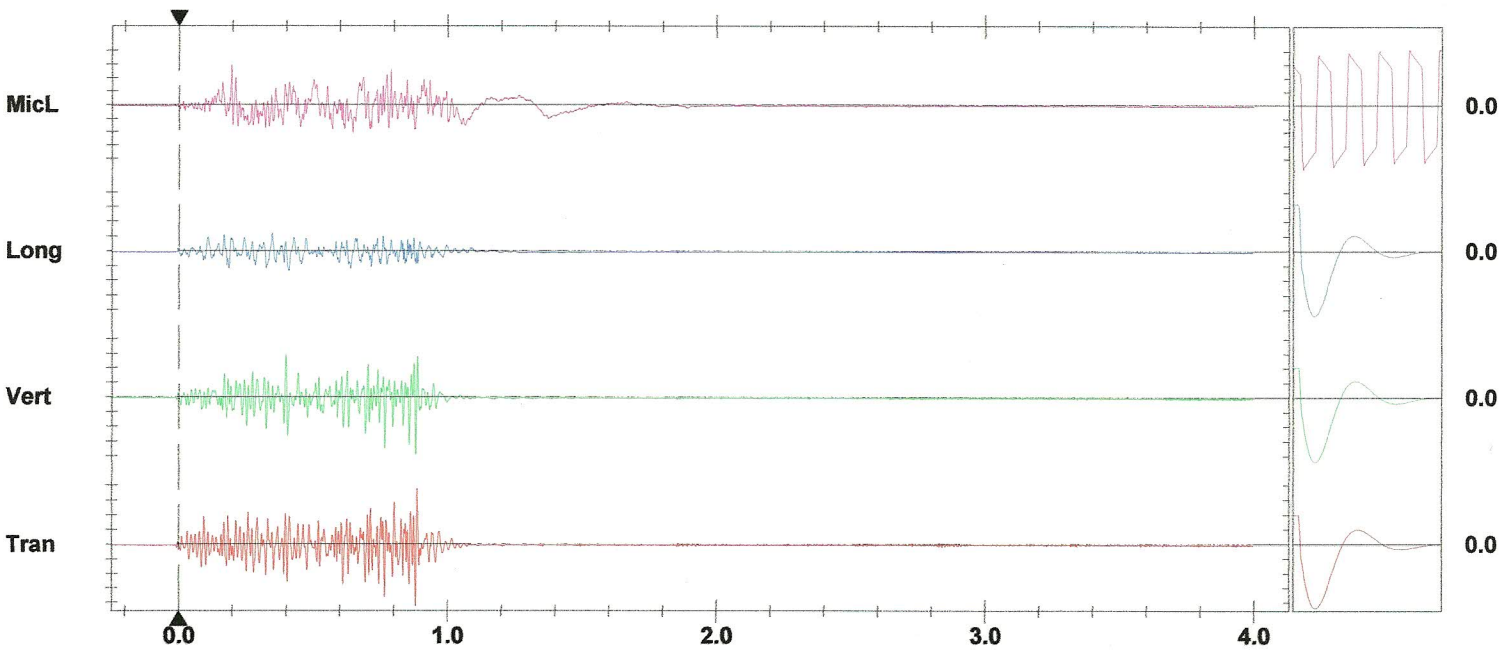
Extended Notes
I-90 Widening Hyak to Snowshed. Geophone attached to bracket on soil nail wall near snowshed.

Microphone Linear Weighting
PSPL 0.00301 psi(L) at 0.200 sec
ZC Freq 46 Hz
Channel Test Passed (Freq = 19.7 Hz Amp = 621 mv)

	Tran	Vert	Long	
PPV	0.840	0.775	0.260	in/s
ZC Freq	71	73	30.1	Hz
Time (Rel. to Trig)	0.885	0.885	0.412	sec
Peak Acceleration	1.22	0.848	0.371	g
Peak Displacement	0.00185	0.00175	0.00123	in
Sensorcheck	Passed	Passed	Passed	
Frequency	7.2	7.6	7.8	Hz
Overswing Ratio	4.1	3.6	3.9	

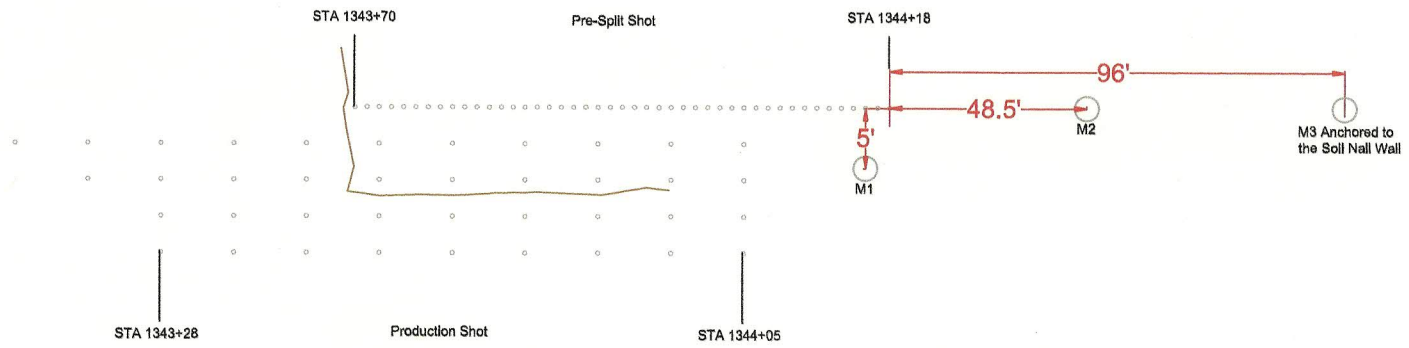
Peak Vector Sum 1.15 in/s at 0.885 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 0.200 in/s/div Mic: 0.00100 psi(L)/div
Trigger = ▶——◀

Sensorcheck



M1 - Near Field, HI Frequency Unit
M2 - 50' Ft. away from Nearest Drill Hole
M3 - Anchored to Soil Nail Wall

HORIZONTAL SCALE	1"=10'
VERTICAL SCALE	Same
DESIGNED	DATE 00-00-00 BY LL
DRAWN	DATE 00-00-00 BY RJB

SubTerra, Inc.®
P.O. Box 520, 216 East North Bend Way, North Bend WA 98045
Telephone: (425) 888-5425 E-mail: SubTerra@subterra.us Fax: (425) 888-2725

Seismograph Layout
Blast Monitoring I-90 Hyak
October 6th, 2010
Production and Pre-Split Sho
Blast # SN2

X:\DraftingSetup\AutoCAD\templates\SubTerra 2005.dwt 4/10/2006 1:21:48 PM PST

Charley Murphy

From: Jennifer Edgington [jennifer@xwest.net] **Sent:** Thu 10/7/2010 1:34 PM
To: Charley Murphy
Cc:
Subject: RE: Northwest Energetics pricing
Attachments:

The 25 grain is actually 18 grain at $.21 per ft.

50 grain is $.31 per ft.

30' MS are $4.79

MS connectors are $5.21 ea.

From: Charley Murphy [mailto:charley@blastwest.com]
Sent: Thursday, October 07, 2010 11:52 AM
To: Jennifer Edgington
Subject: RE: Northwest Energetics pricing

Sorry to keep bothering you but my boss is doing a lot of job cost work and needs prices for 25 gr cord, 50 gr cord, 30ft excel 500ms, msc 17 surface delays for cord. Thanks Charley

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From: Jennifer Edgington [mailto:jennifer@xwest.net]
Sent: Thu 10/7/2010 9:56 AM
To: Charley Murphy
Subject: RE: Northwest Energetics pricing

Hi Charley,

Senatel Powersplit 7/8 x 16 - $3.86 lb.

Primaflex 400 - $2.01 ft.

Powercord 200 - $.87 ft.